

History of botanical explorations in Nepal¹

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An attempt has been made in this paper to trace out the history of plant collection in Nepal. Plant collection in Nepal begins from the early nineteenth century when Buchanan-Hamilton visited the valley of Kathmandu in 1802. Later in 1820 Nathaniel Wallich travelled from Raksaul in the south to Nuwakot collecting plants en route. Hooker (1848), Burkill (1907) and other English botanists like Polunin (1949), Sykes, Williams (1952), Stainton (1954) play important roles in increasing the botanical wealth of Nepal. Indian botanists are also active in the collection of Nepalese plants since 1929 when B. L. Gupta had made a trip in western Nepal. J. Banerji (1948), S. K. Banerji (1949), M. L. Banerji (1948-1965), and V. Puri (1954) collected plants from eastern as well as central parts of Nepal. M. L. Banerji had submitted his Ph.D. thesis on the Nepalese flora in 1958. Japanese expedition of 1952 in Central Nepal brought several new plants to light. Since 1960 University of Tokyo seems to be interested in the flora of Eastern Himalayas including Nepal.

In 1961 a National Herbarium was established in Kathmandu to preserve all the plants of Nepal collected through the Department of Medicinal Plants.

INTRODUCTION

Nepal, situated on the mid-Himalayas between 26°20'-30°10' N and 80°15'-88°10' E, has an area of 54,362 square miles, with an average length of 550 miles from Mechi river in the east to the Mahakali river in the west. The width varies from 150 miles to 90 miles. The major part of the country consists of high mountains and rolling hills, accounting for about 83 per cent of the total land area, the remaining 17 per cent is occupied by the flat lands of the Terai. The altitude varies from 500 to 29,000 feet. The vegetation varies from tropical to alpine.

1800 - 1900 A.D.

Kirkpatrick, 1793:

The botanical exploration in Nepal begins with the visit of Buchanan-Hamilton to Nepal

in 1802, though a few years before Hamilton, Colonel Kirkpatrick had visited Nepal in 1793 on a political mission to the country. Kirkpatrick's book 'AN ACCOUNT OF THE KINGDOM OF NEPAUL' published in 1811 gives a vivid sketch of the vegetation of Nepal from Terai at Birgunj to midland valley at Kathmandu. Most of his botanical descriptions include the Nepali vernacular names.

Hamilton, 1802:

Buchanan-Hamilton (1762-1829), later Sir Francis Hamilton visited Nepal during 1802 to 1803. He was the third superintendent of the Royal Botanic Gardens at Calcutta. In 1814 he succeeded Roxburgh, the second superintendent of the Garden. He returned to England in 1815 after making extensive tours in Nepal. Hamilton was perhaps the first botanist to visit Nepal. He was one of the most productive authors who worked for the East

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India Company. He visited Nepal only once with the mission of Captain Knox. Collecting information was not an easy task as he was unable to see anything beyond the road leading from the plains to the Kathmandu Valley where he stayed for eleven months. He had to rely on informants whom he himself had chosen. Concerning the country between Sikkim and Nepal proper, his information was chiefly derived from the five different sources. Among them was a slave of the King of Gorkha, who had been received into his service in order to bring plants from the Alpine regions. Finding him very intelligent, and a great traveller, Hamilton employed him to construct a map. He had also gone to the Company's territories all along the southern border of Nepal, from Sikkim to the headwaters of the Ganges, in order to collect information from people coming down from the mountains. This task seemed to have been completed by 1814. He took the plants collected here to England where they were worked by Don. His book 'AN ACCOUNT OF THE KINGDOM OF NEPAL' published in 1819 deals with the history of Nepal and contains chapters which describe the vegetation of Nepal.

Wallich, 1820:

The second botanist to visit Nepal was Nathaniel Wallich (1786 - 1854). He was the superintendent of the Royal Botanic Gardens, Calcutta from 1815 to 1835. He organized collecting expeditions to Nepal, Western Hindustan, Lower Burma, and made vast collections of plants which were studied by Candolle, Kunth, Lindley, Bentham and others. Wallich spent a year at Kathmandu (1820 - 1821) and collected plants intensively in the valley and along the wooded hills surrounding it. Although he was not allowed to go beyond the confines of the valley, he prevailed on pilgrims

to bring him plants from the mountains surrounding the sacred lakes of Gossain Than, which lie at an altitude of 15,000 feet and are three to four day's march north of Kathmandu. They are visited annually, by thousands of pilgrims during the months of August and September, and it is from this locality that many interesting Himalayan plants were recorded for the first time by Wallich. His plants are described in his *TENTAMEN FLORAE NEPALENSIS* (1824).

These two Nepalese collections of plants (Hamilton, Wallich) were preserved in A. B. Lambert's extensive herbarium.

In 1825 and 1826 two volumes of *PRODROMUS FLORAE NEPALENSIS* by David Don appeared containing 766 species of phanerogams. This pioneer work was prepared by Don while he was employed as the librarian of Lambert. This book is actually the compilation of the flora of Nepal collected by Hamilton and contains the description of some of Wallich's Nepal plants. It includes some interesting horticultural plants as *Primula rotundifolia* and *Potentilla coriandrifolia*, which were not rediscovered until 1927. Don's book was written in standard Latin. Reviewing it John Lindley said it is 'written in so strange a language, that we can scarcely guess its name, unless, "with great facility, after three lessons of an hour each", without the incumbrance of previous education' (Stearn 1973, pp. 13). Don not only described many new species collected from Nepal but also formed new genera. *Trichosporum* and *Lysionotus* were recognised as two new genera by him for the plants collected by Wallich from Nepal, who had mistakenly identified them as *Incarvillea parasitica* and *Incarvillea* sp. respectively.

Hodgson, 1822-1843:

There has been a British resident at Kath-

mandu since 1817. In 1822 Sir Brian H. Hodgson came to Kathmandu and lived for about 21 years (1822 to 1843) in the valley. He was the first person to bring to the notice of western scientists the incredible variety of plants and animals of Nepal. As he was obliged to stay in Kathmandu by an order of the Nepalese court, he employed Shikaris or professional hunters to collect animals for him. His primary interests were ornithology and herpetology, and he did little plant collecting himself. However, he encouraged his fellow countrymen to look into the plant life of Nepal.

Hooker, 1848:

The third botanist to come to Nepal was Sir Joseph Dalton Hooker in 1848. His plan was to explore botanically little known region of Himalayas. Sikkim was chosen for him to explore by Lord Auckland and Dr. Falconer. During this trip Hooker entered into Nepal through the eastern border and collected plants in the valley of Tamur and Arun reaching as far north as Wallunchoongola. He wanted to cross, into Tibet, but the porters refused to go any farther north. He, therefore, returned to Sikkim.

Entry into Nepal was not an easy task for him. It was only with the help of Dr. Campbell, who had gained the friendship of Jung Bahadur, that he could get permission to enter and explore Nepal. No European at that time was allowed to travel anywhere except to and from the plains of India and valley of Kathmandu. Hooker was fully equipped with porters and instruments during his travelling. While traversing in Nepal his party consisted of fifty-six persons including himself, and one personal servant, a Portuguese half caste.

Hooker's travels in the eastern Himalayas are described in his book HIMALAYAN JOURNALS Vols. 1 & 2, published in 1855. These

books are truly the classics in the botanical literature of the world. He reported on the general features, geography, vegetation, and climate of the region unknown to the western world at that time. Bower considered HIMALAYAN JOURNALS to rank with Darwin's Voyage of the Beagle, and Wallace's Malay Archipelago, 'these books forming a veritable trilogy of the golden age of travel in pursuit of science.' (Hutchinson 1964, pp. 23). The Nepalese plants which he collected are described in his books 'The Flora of British India, Vols. 1-7 (1875-1897), which are much exploited during the recent times also while describing the Nepalese flora.

Scully & Duthie:

Dr. J. Scully in 1876 and J. F. Duthie in 1880 to 1884 have been reported to have collected plants along the Mahakali river in the border of Kumaon and Doti Baitadi districts of west Nepal.

1900-1950 A.D.

Burkill, 1907:

On November 28th, 1907, after marching along nearly one hundred miles of the Nepalese frontier between Jainagar and Raksaul, I. H. Burkill turned into the Kingdom of Nepal and reached Kathmandu by the usual route on 2nd December. Thence with his friend, Lieut-Colonel J. Manners-Smith, the Resident, he visited the Trisuli Valley, in the neighbourhood of Niakot (Muwakot).

Burkill returned from Kathmandu to the plains by a route through Pharping, which diversified the first seventeen miles of the way. His dates of visit almost coincided seasonally with the dates of Wallich's march to Kathmandu, and it seems, Burkill and Wallich, gathered plants with a gap of 87 years the same plants in the same spots. Wallich had

thoroughly explored the areas he had visited so Burkill got no more new plant records but three species of *Impatiens* and apparently one *Eriocaulon*.

Burkill listed plants that he came across on his march to Niakot in a very descriptive way and compared the flora to that of adjoining areas of Bhutan and Sikkim. His 'Notes from a Journey to Nepal' (1910) gives about 470 plant species that he collected and refers to other plants reported from Nepal by Wallich.

Landon's Nepal, 1928:

Prior to 1928 the literature on Nepal was very meagre, but in that year were published two handsome volumes entitled 'Nepal' by Percival Landon (1928). This talented author was given special privileges by the Nepal authorities, so that this book was the most authoritative and comprehensive account of Nepal at that time, but he died before his fascinating account of Nepal was through the press.

Published as an Appendix XIV in the same book, Nepal, is 'Flora of Nepal', compiled under the authority of the Director of the Royal Botanic Gardens, Kew (from different sources such as D. Don's PRODRUMUS FLORAE NEPALENSIS, N. Wallich's TENTAMEN FLORAE NEPALENSIS, Col. R. H. Beddome's FERNS OF BRITISH INDIA, Hooker's THE FLORA OF BRITISH INDIA, Sir G. King and Pantling's THE ORCHIDS OF SIKKIM HIMALAYAS in Annals of the Calcutta Garden, Vol. III, I. H. Burkill's Notes from a Journey to Nepal (Records of the Botanical Survey of India, Vol. IV). This 'Flora of Nepal' consists of a list of 1672 phanerogams.

Wollaston, 1922:

In 1922 Balfour published some new species of plants collected by Mr. A. F. R. Wollaston,

Medical Officer and Naturalist to the Mount Everest Expedition, 1921. The complete set of the whole collection was presented to the Royal Botanic Gardens, Kew, by the Mount Everest Committee. The new species from the neighbourhood of Mt. Everest described were *Aconitum orochryseum* Staff, *Tanacetum khartense* Dunn., *Anrosace sessiliflora* Turrill, *Primula buryana* Balf. f., *P. wollastonii* Balf. f., *P. younghusbandiana* Balf. f., *Gentiana stellata* Turrill, *G. tubiflora* Wall. var. *longiflora* Turrill, *Dracocephalum breviflorum* Turrill.

Collections between 1927-1949:

Between 1927 and 1931, two Nepalese collectors, Major Lal Dhwoj and Prof. Khadanda Sharma, made extensive journies in Nepal in search of herbarium specimens and horticultural treasures. They found some outstanding new and little known plants such as *Meconopsis regia*, *M. longipetiolata*, *M. dhwojii*, *Primula wigramiana*, *P. wollastonii*, *P. buryana*, *Cyananthus hayana*, *C. pedunculatus* var. *crenatus*, *Gentiana ornata*. Many of these plants were first grown by T. Hay in Hyde Park from seeds sent by these collectors and some of them are now well established in British gardens. It is difficult to follow the exact routes of these collectors owing to variation in the spelling of place names, but they covered most of East, Central and West Nepal, as far as the massif of Annapurna, and it is probable that they collected most of the conspicuous and attractive alpine plants of this area.

In the spring of 1929 with the permission and cooperation of the Nepalese Government a botanical party consisting of Mr. Basant Lal Gupta, Botanical Assistant at the Forest Research Institute, Dehra Dun, and Bis Ram, collector, entered Nepal being joined by Ma-

Major Lal Dhwoj, a representative of the Nepalese authorities. It was the intention of the party to collect in the valley of the Karnali river in the neighbourhood of Simikot as this area was likely to be of considerable interest.

Unfortunately Mr. Gupta was taken seriously ill and had to be carried back from Silgarhi. The collector Bis Ram remained behind but it was a long time before instructions could be sent to him to continue the work alone. As the funds with which the party had started had to be divided an insufficient amount was left with the collector, which did not enable him to go more than 5 or 6 stages beyond Silgarhi. The area, explored, therefore, contained little of special interest. About five hundred plant species were collected during this expedition. These plants are listed in Forest Bulletin (Botany Series No. 76, 1931).

Major Lal Dhwoj was selected in 1928 by the then Prime Minister of Nepal for the task of collecting seeds and specimens. As a young man, Major Dhwoj had some botanical training in the Darjeeling Botanic Garden, and he had an eye for a good plant. In 1931 he died at his task and so did not live to receive the Gold Medal awarded to him by the Royal Horticultural Society. After the death of Dhwoj a very worthy successor had been found in the person of Professor K. N. Sharma; his botanical knowledge, care in the selection of specimens and seeds, the fulness of his field notes, and other qualities, was a pleasant surprise to botanical authorities in U.K.

Sir C. Wigram and Sharma collected plants from 1927 to 1931. The major set of their collection are preserved at the British Museum and have been little worked out so far as *Meconopsis*, *Primula* and *Gentiana*. Some parts of the collection are at the Herbarium, Royal Botanic Garden, Edinburgh.

During 1935 and 1937 Bailey collected

plants in the valley and also sent collectors to west and central Nepal.

In 1948 J. Banerji visited the eastern part of Nepal in connection with the Kosi Project and collected plants in the valleys of Tamur river.

Dr. S. K. Banerji, Keeper of the Indian Botanic Garden that time collected plants along the Nepal-Sikkim border in 1949.

Polunin & Lowndes, 1949-1950:

In 1949 Oleg Polunin had the good fortune to be asked to join an expedition to the central Nepal Himalaya which was being organized by the Himalayan Committee. It was the first time since the memorable journey of Sir J. D. Hooker in 1848 to East Nepal, that a European party had been given permission to explore the mountains lying within the boundaries of Nepal.

The expedition was organized in the first place as a climbing expedition under the experienced leadership of Major H. W. Tilman, but on the recommendation of the then Prime Minister of Nepal, two scientists were included in the party. Their itinerary was the two mountain massifs lying on the Nepal-Tibet boundary, the Langtang Himal and the Ganesha Himal with peaks of 23,000 feet and 24,000 feet. Polunin visited Langtang, Rasua Garhi, and Chilime Khola to the north of Kathmandu, and found *Gentiana nubigena*, *Saussurea gossipiphora*, primulas and rhododendrons at an elevation of 16,000 feet. In 1950 Col. D. G. Lowndes collected seeds and plants in the vicinity of the Marsyandi River, Manangbhot, and the Jargeng Khola. Some of the high altitude plants collected by Col. Lowndes at 10,000 to 16,000 feet were: *Pedicularis*, *Primula*, *Lonicera*, *Ephedra* and *Delphinium*. The collections of Polunin and Lowndes, which went to the Herbarium of the

British Museum (Nat. Hist.) and which included the new species *Rhododendron cowanianum* and *Rh. lowndesii*, whetted the British appetite for further botanical collecting. A small list of flowering plants collected in Langtang area is published as an Appendix in Tilman's NEPAL HIMALAYA 1950.

1950-1974 A.D.

The revolution of 1950-1951 brought about a significant change in the outlook of the Government and people of Nepal toward foreigners, who were given greater freedom to explore the country in the post revolution period, and the many mountaineering expeditions that have come to Nepal since this period gave opportunity to a number of botanists to explore plant life in the Himalayas.

British Expeditions:

The British Museum (Natural History) started to send botanical expeditions to Nepal from 1952. In the spring of 1952 an expedition was organized jointly by the British Museum (Natural History) and The Royal Horticultural Society. The party consisted of three botanists, Leonard Howard John Williams, Oleg Polunin and William Russel Sykes. They explored an area of about 1000 square miles lying between the Karnali and Kali Gandaki rivers in western Nepal in the districts of Jumla, Humla, Jajarkote and Salyan. As a member of the staff of the Royal Horticultural Society Gardens at Wisley, Sykes was trained as a botanical and horticultural collector. In the field they were assisted by six native collectors, some of whom had been on collecting journeys with both Ludlow and Sherriff, and Kingdon-Ward. The general plan of the expedition was to make direct for Jumla and using this village as their base, to work as 3 parties so that as much ground as possible could be

covered. Each party was to consist of one European with two native collectors. The Nepalese Government provided each party with an escort of three constables and they found these men invaluable not only for their help in the often difficult task of obtaining coolies and food but also in assisting with the daily drying of their plant press papers.

In March 1954 another expedition was jointly sponsored by the British Museum (Natural History) and The Royal Horticultural Society to collect in central Nepal. The country south of the great mountain ranges of Dhaulagiri and Annapurna, and the drainage system of the Kali Gandaki river between and behind them, was then unknown botanically and zoologically. Besides Mr. John D. Adam Stainton and W. Sykes, who were both botanists, the party consisted of Mr. L. H. J. Williams (Botanist and leader), Mr. K. Hyatt (zoologist), Mr. J. Quinlan (entomologist), all from the British Museum (Natural History). In India they were joined by Dr. V. Puri of Meerut College, who remained with the expedition for nearly two months. They decided to make the little town of Pokhara, south of the Annapurna range, their main base because it possessed reasonable means of communication with the outside world, including a fairly regular air service to and from Kathmandu to the east and Indian border to the south. As in the case of the expedition of 1952, the 1954 expedition also decided to separate into three parties in order to collect over a larger area. It fell to Williams to work the area south of the Annapurna range, Stainton was to concentrate upon the area of the Upper Kali Valley towards the Tibetan border, while Sykes was to journey westward to the country to the south and south-west of the Dhaulagiri range. In the party of Sykes, which was composed similarly to the other parties, he had

a Lepcha collector making his third plant-collecting expedition, a Bhotiya, who primarily came as a cook, and usually eight or nine porters each carrying about 60 lb. The latter were recruited locally, and those from the higher villages were usually very strong and hardy peoples of the Magar and Gurung branches of the Gurkha race.

These two big expeditions together with the previous ones of Polunin and Lowndes, brought back a total of over 17,000 gatherings of plants for the herbarium of the Museum.

After these expeditions Stainton became deeply interested in Nepalese flora. He took interest in the vegetation of Nepal since that time and after making many tours and collections in almost all parts of Nepal, Stainton wrote FORESTS OF NEPAL (1972) a very valuable book when considering the phytogeographical problems of certain plants.

All the gatherings of plants of Stainton went into the herbarium of the British Museum. In fact the number of gatherings from Nepal in the herbarium of the Museum totals probably around 40,000 at present. The enumeration of 'Flowering Plants of Nepal' by L. H. J. Williams which is being published quotes over 6,000 species.

Quite a large number of new species are noted for the first time as the outcome of these British expeditions. It is the intention of the British Museum 'to publish from time to time descriptions of new species and interesting records of plants represented in the extensive collections which have accumulated in the Museum from the Himalayas and neighbouring countries' (*Novitates Himalaicae*, 1955-62, p. 1). Some of the new species described are *Pedicularis pseudoregeliana*, *P. poluninii* (Tsoong 1955); *Saussurea chrysotricha*, *S. linearifolia*, *S. platyphyllaria* (Ludlow 1955-62); *Berberis mucrifolia* (Ahrendt 1956);

Saxifraga royleii, *S. alpigena*, *S. williamsii*, *S. hypostoma*, *S. lowndesii*, *S. mira*, *S. poluniana*, *S. staintonii*, *S. rhodopetala*, *S. micans*, *S. cinerea*, *S. excellens*, *S. sphaeradena* subsp. *sphaeradena*, *S. namdoensis*, *S. lepida*, *S. glabricaulis*, *S. contraria*, *S. granulifera* (Smith 1958, 1960); *Silene helleboriflora* (Excell & Bocquet 1959-61); *Allium hypsistum* (Stearn 1960); *Epilobium staintonii*, *E. sykesii*, *E. brevisquamatum*, *E. williamsii*, *E. squamosum*, (Raven 1962); *Nepeta staintonii*, *Lamium tuberosum*, *L. staintonii*, *L. nepalense* (Hedge 1963-69); *Aconitum tamuranum*, *A. balan-grense*, *A. staintonii*, *A. williamsii*, *A. amplexicaule*, *A. poluninii* (Lauener 1964); *Pedicularis annapurensis*, *P. armatoides*, *P. chamissonoides* (Yamazaki 1970); *Meconopsis taylorii* (Williams 1971); *Rubus acaenocaly*, *Begonia minicarpa*, *Bilderdykia filipes*, *Fagopyrum megacarpum*, *Impatiens williamsii*, *Pegaephyton minutum* (Hara 1972); *Elaeagnus kanaii* (Momiya & Hara 1973); *Eriocaulon staintonii* (Satake 1973).

Mrs. Proud's Collections:

Mrs. Proud, the wife of Col. Proud, who was for a long time attached to the British Embassy at Kathmandu, had also been a regular collector for the British Museum but the list of her collections is not available. Writing about *Primula aureata* H. R. Fletcher says, 'In 1952, Mrs. Desire Proud sent to the Herbarium of the Botany Department of the British Museum, various fragments of plants which she had collected in Nepal. But among the fragments was an entire plant, in full flower and beautifully pressed, which Mr. Frank Ludlow recognised immediately as *P. aureata*. This is the only known specimen of the plant to have been collected in the wild and Mrs. Proud has given me details of the habitat. She found a small colony of five or

six plants on the steep slopes surrounding the head water of the Thadi Khola, a tributary of the Gandak, and some 20 miles as the crow flies (But 5 days on foot) almost due north of Kathmandu'. (Fletcher 1953, p. 177).

Japanese Expeditions:

In 1952, the reconnaissance party to Manaslu, Nepal, was organised by the Japanese Alpine Club (JAC). Kinzi Imanishi, an ecologist and anthropologist, and Mr. Sasuke Nakao, a botanist, member of both the Fauna and Flora Research Society (FFRS), and JAC, were elected to join. The party was organised originally to find a route to Manaslu, and consisted of six members under the leadership of Imanishi.

Again in 1953 the Himalayan Committee decided to send a party to scale Manaslu from the same side during the premonsoon season. Jiro Kawakita, an ethnologist and geographer, member of the FFRS and JAC, and Nakao joined the climbing party of the Manaslu expedition. On March 28, with an interpreter and seventeen porters, they separated from the climbing party at Panch Mane Bhanjyang which is a day's journey from Kathmandu. Nakao had joined the expedition especially to collect the plants from the Himalayan regions. He collected in central Nepal from September to December, 1952, entering the alpine belt up to the snow line, approximately 1000 dried specimens, seeds of both wild and cultivated plants, and stocks of perennial herbs and shrubs. In 1953 he made a botanical journey to central Nepal from April to August, and he devoted himself to herbs bringing about 4000 specimens and many seeds. Tadashi Fujimura, a member of the Annapurna Expedition of ACK collected about 250 specimens in central Nepal, from

September to December, 1953. These herbarium specimens are preserved both in the Herbarium of the National Science Museum in Tokyo and in the Herbarium of the Botanical Institute, Faculty of Science, Kyoto University. The results of the above expeditions are published in three volumes. The first volume FAUNA AND FLORA OF NEPAL HIMALAYA is entirely devoted to the flora and fauna of Central Nepal and consists of 924 species of phanerogams. A number of new reports and new species of plants are described in this volume, some of them such as *Aristolochia nakaoui*, *Saxifraga nakaoui*, *Micromeria nepalensis*, *Corydalis nepalensis*, *C. mitae*, *Geranium nakaonum* are noteworthy.

FLORA OF EASTERN HIMALAYA was published in 1966 under the editorship of Hiroshi Hara. This book includes the scientific results obtained from the Botanical Expeditions to Eastern Himalayas by the University of Tokyo in 1960 and 1963. The main objects of their expeditions were to make clear the close botanical relationship between Eastern Himalaya and Japan, to investigate critically the corresponding taxa in both regions, and to analyse the process of evolution in the plant groups originating from a common ancestor in the Early Tertiary and now widely separated in both regions. They had, therefore, concentrated their effort to study the temperate flora of Eastern Himalaya in comparison with that of Japan. Their collections consisted of about 60,000 specimens of plants, in which many new species were noted. *Salix plectilis*, *Baliospermum nepalense*, *Tithymalus pseudosikkimensis*, *Liparis togashii*, *Malaxis tamurensis* are the new species described in this book. Among the newly reported plants *Tetracentron sinense* and *Hydrobryum griffithii* are important, as these plants throw some light on the affinities between the flora of Japan and east

Himalayas as their very close allies are found in Japan.

The Third Botanical Expedition to Eastern Himalaya (Bhutan, Nepal) in 1967 and the Fourth Expedition (Nepal, Sikkim) in 1969 were again organised by the University of Tokyo. The results of these expeditions are published in FLORA OF EASTERN HIMALAYA Second Report, in which new species from Nepal as *Eriocaulon exsertum*, *E. kathmanduense*, *E. obclavatum*, *Bulbophyllum otoglossum* are described. This book also includes supplementary remarks to an earlier volume of the FLORA OF EASTERN HIMALAYA and which was based on the data from the botanical expeditions by the University of Tokyo.

In 1963, from April to June, the Himalayan Expedition Club of the Chiba University organised an expedition to Eastern Nepal under the leadership of Makoto Numata, an ecologist. The target of this expedition was to climb Mt. Numbur (6954 m) and to carry on the vegetational analysis of the area in the vicinity of Numbur, which was carried out by Kyoji Yoda. Numata collected grasses, bamboos, weeds etc. from these areas and studied their ecological condition.

Swiss Expeditions:

In 1949 Wyss-Dunant collected plants in the north-east regions of Nepal. The two Swiss expeditions, one to the Everest in 1952 and the other to Gaurisankar in 1954, were also active in studying Nepalese plants and collecting them. These expeditions were jointly organised with the alpine expeditions. The first was led by Dr. Edouard Wyss-Dunant and Rene Dittert, leaders of the Swiss Expedition to the Everest, the second by Raymond Lambert. The botanical party was placed under the direction of Prof. Charles Baehni, director of 'Conservatoire et Jardin botaniques de

Geneve'. The results of these expeditions are published serially in *Candollea*.

Banerji's Collections:

Since 1948 Mohan Lal Banerji had visited eastern Nepal collecting plants for a number of times. During his training at the Botanical Survey of India, 1947-49, one of the duties assigned to him was the cataloguing of the sheets of Nepal plants housed in the Calcutta Herbarium. In the course of this work he soon realised that Nepal was one of the botanically least known parts of Asia. This presented him a challenge and a problem, which he decided to tackle at the earliest opportunity. In 1948, he was on deputation with the Central Water Power and Irrigation Commission, which organised a Soil Conservation Expedition to East Nepal. In the course of his work as a botanist to the commission, he made an extensive collection of plants mainly from the Kosi Catchment area. These plants are now preserved in the herbarium of the Indian Botanic Garden, Calcutta.

This was his first experience in the study of the flora of Nepal in the field. On termination of the training scheme of the Botanical Survey of India in 1949, he joined the Meerut College, Meerut, and he was for several years given facilities to carry on his exploration of Nepal.

After his first visit to Nepal he decided to limit his field of exploration to East Nepal, as he thought, the whole of Nepal was too large an area for a single botanist to explore. In all, seven expeditions were organised to East Nepal between the years 1948 and 1957.

In 1958 Banerji submitted his Ph.D. thesis 'Contribution to Flora of Nepal' reporting 591 dicots. In the same year 'Botanical Exploration in East Nepal' was published in Journal of the Bombay Natural History Society reporting 169 species of flowering plants belong-

ing to 123 genera of 51 families. In 1965 he published 'Contribution to the Flora of East Nepal' in Records of the Botanical Survey of India giving short descriptions of 583 species of flowering plants belonging to 342 genera, out of 109 families of Dicotyledons only. In this paper a new variety of *Caltha palustris*, and of *Acer campbelli* are described.

Out of these expeditions Banerji found new species of *Pimpinella* and *Cuscuta* and named them as *P. clarkeana* and *C. santapau*.

In the words of Banerji some of the results of explorations in East Nepal obtained by him are the following: (Banerji 1965)

(i) The area which botanically was scarcely known previously, has been covered extensively, and large collections of plants have been made in it and at the same time abundant field notes taken on the spot.

(ii) As a result of the work, well over 75 new records have been established for the area under study. Further a number of new taxa have been described for the first time.

(iii) From the phytogeographical point of view this exploration has been able to produce a number of 'missing links' between the plants of the eastern and those of the western Himalayas. In this way the range of a large number of plants has been extended far beyond the previously known limits'.

Other Collections:

In 1953, John Tyson made a collection of plants in the vicinity of Api in west Nepal.

Oxford University organized an expedition to west Nepal in 1954. The original plans of the expedition were to explore the Saipal Group, east of Api. Dr. Harrington, leader of the expedition, was to carry out geological research, J. E. M. Arnold was the botanist collecting plants above 14,000 feet for the British Museum, Murray was to collect mice

and lizards, also for the British Museum, I.F. Davidson was to study the people, with particular reference to their religion.

Seshagiri Rao Rolla was connected with the Indian Cho Oyu Expedition of 1958. He collected plants in the eastern Nepal during this expedition.

C. Jest in 1961 collected plants in North-West Nepal in the region of Dolpo and prepared a list of these containing 133 species of flowering plants. These plants are deposited in the Laboratoire de Phanerogamie, Museum National d'Histoire Naturelle, Paris.

Kazuhiro Itoh and S. B. Rajbhandari went on botanical survey of West Nepal along Ghurchi (3,000 m) and Khaptar (3,300 m) in 1963. The object of their survey was collection of general plants, especially the medicinal ones. During their survey about 1000 plant specimens were collected. A list of 132 plants with their notes is given in a report by Itoh. An extensive list of medicinal plants of Nepal with the corresponding Vernacular names also is given in it.

Rimal (1968) gave a list of gymnosperms collected in Kathmandu and its surrounding hills which include cultivated as well as wild ones.

Swan's Studies:

L. W. Swan, an ecologist, made two trips to the Nepal Himalaya, first with the American Himalayan Expedition to Makalu (27,790 ft) in 1954, and again in 1960 with Sir Edmund Hillary's Yeti hunting expedition. He collected plants and animals in the neighbourhood of Barun Glacier and certain other unnamed peaks in that region, and found evidence of life at the extreme altitudes of 19,000-22,000 feet. At 20,130 feet he found a small cushion plant (*Stellaria decumbens*) and in this area there was no evidence of other plants.

It seemed to him that this was near the upper limit for flowering plants; 'In all likelihood 20,130 feet stands as the highest altitude at which any living plant has been collected, though it is reasonable to expect that flowering plants can be found still higher.' (Swan 1960).

Rao's Collections:

C. R. Rao in 1967 published a paper entitled 'Plant Collection in Eastern Nepal' in *Indian Forester* in which he gave a list of 200 species of flowering plants he had collected belonging to 60 families. Rao's study was based on a number of botanical excursions undertaken in different parts of the Kosi Catchment at various seasons during the years 1950-1960 (Dr. K. George and K. B. Thapa), 1962-1963 (C. R. Rao). Plant collecting had been done upto an altitude of 2,592 m (8,500 ft) in Eastern Nepal. Out of these excursions Rao noted a new species of *Begonia* and described it under the name of *B. tribenensis*.

Dobremez's Studies:

J. F. Dobremez, an ecologist, came to Nepal in 1968 to carry on ecological studies. He started the preparation of the ecological maps which would cover the whole of Nepal. The series of maps published already are of Annapurna-Dhaulagiri, Jiri-Thodung and Kathmandu-Everest regions. In 1972 Dobremez published his thesis for D.Sc. on the ecology of Nepal Himalaya.

Activities of the Department of the Medicinal Plants:

Formerly the Department of the Medicinal Plants was just a small section of Botany (Banaspati Phant) which was established in 1937 in order to exploit and deal with the trades of crude herbs and drugs of Nepal. Prof. Khadananda Sharma, a chemist, was the head of this section. During this time a herbal farm in Shivapuri, north of Kathmandu at an

altitude of 6,000 ft with about 3-4 acres of land was set up. Some important exotic herbs like *Digitalis purpurea*, *Saussurea lappa* and indigenous herbs like *Aconitum laciniatum* were cultivated. In 1961, a new plan was introduced for the development and research on the Nepalese crude herbs and drugs and a name Department of Medicinal Plants was given for this section. The Botanical Survey and National Herbarium is one of the sections of this Department. Twice or thrice a year the Department sends collecting expeditions to different parts of the country and the plants collected are preserved in the Herbarium section. At present there are more than 60,000 sheets of specimens housed in the Herbarium. It is expected that more than 6,000 species of flowering plants are present in Nepal. However, only about 3,500 species have been collected from different localities of Nepal.

In 1967 the first book 'Keys to the Dicot Genera in Nepal Part I (Polypetalae)' appeared which was the first venture of the Department published under the guidance of Dr. M. L. Banerji. The second book 'Keys to the Dicot Genera in Nepal Part II (Gamopetalae and Monochlamydeae)' of this series came out in 1968, which was the product of a joint venture of Mr. Tirtha Bahadur Shrestha of the Department and Dr. Dan H. Nicolson. These two books help much in identifying the dicot flora of Nepal both in the field and in the laboratory. Since 1967 the Department is publishing a series of flora of local regions like 'Notes on Flora of Rajnikunj' (1967), 'Flora of Phulchoki and Godavari' (1969), 'Flora of Nagarjun' (1973). These books are just the preliminary work of the Department for the preparation of a detailed 'Flora of Nepal'. The responsibility for the preparation of 'FLORA OF NEPAL' has been taken by the Department, and work is in progress.

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